An HTML 5 Primer

prepared by

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HTML 5 and HTML 4\cite{1}

What’s the difference?

- Simple DOCTYPE declaration
- Elements which improve document structure
  - Ex: `<section>`, `<article>`, `<aside>`, `<header>`, `<footer>`, `<nav>`, `<dialog>`, `<figure>`, `<details>`, `<progress>`
- Elements which facilitate or add functionality
  - Ex: `<audio>`, `<video>`, `<canvas>`, `<datagrid>`, `<datalist>`
- New `<input>` types
  - Ex: `datetime`, `date`, `month`, `week`, `time`, `number`, `range`, `email`, `url`
- `ping` attribute for `<a>` and `<area>` elements
- `charset` attribute for `<meta>` element
HTML 5 and HTML 4
What’s the difference? (continued…)

• form attribute for <input>, <output>, <select>, <textarea>, <button>, <fieldset> elements

• manifest attribute for <html> element supporting client-side offline applications

• New APIs to aid Web App development
  – Worker, 2-D Drawing, History, Offline Cache, and then some...

• Removed presentation-only attributes
  – Ex: align, bgcolor, cellpadding/cellspacing, frame/frameborder, nowrap, valign, width/height
Making an HTML5-compliant Doc

Simple DOCTYPE means creating HTML documents which degrade gracefully into a “standards-compliant mode” in browsers REGARDLESS of which version of HTML is being used.\(^2[3]\)

```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.1//EN"
"http://www.w3.org/TR/xhtml11/DTD/xhtml11.dtd">
...  
</html>
```

```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.1//EN"
"http://www.w3.org/TR/xhtml11/DTD/xhtml11.dtd">
...  
</html>
```

```
<meta http-equiv="Content-Type" 
content="text/html; charset=UTF-8">
```

```
<meta charset="UTF-8">
```

Straight-forward charset attribute makes it easier to have your documents properly displayed in the needed character set.

```
<meta http-equiv="Content-Type" 
content="text/html; charset=UTF-8">
```

```
<meta charset="UTF-8">
```
Semantic Elements in HTML 5

- `<section>`, `<article>`, `<aside>`, `<header>`, `<hgroup>`, `<footer>`, `<nav>`, `<dialog>`, `<figure>`, `<time>`, `<mark>`

- New elements which separate sections of content on the page and provide additional meaning to the browser
- Removes need for ID attributes necessary to identify specific portions of markup
- Correctly use these elements which previously required a “hacked” use of markup tags
  - `<div id="header">` or `<span class="time">`
- Adds value to your HTML markup by giving apps the ability of parsing the important content apart from everything else.
Semantic Elements in HTML 5

Caveats to note in Internet Explorer (surprised?)

- Internet Explorer (in any version) does not correctly insert these elements into the DOM\(^4\)

\[
<\text{article}>
  <\text{h1}>Title</\text{h1}>
  <\text{p}>Article Body with <\text{span}>span text</\text{span}>.</\text{p}>
</\text{article}>
\]

\[
\begin{align*}
\text{Internet Explorer’s DOM} & : \\
\text{Correct DOM} & :
\end{align*}
\]

- \text{Internet Explorer’s DOM:}
  - \text{h1: Title}
  - \text{p: Article Body with span text.}

- \text{Correct DOM:}
  - \text{h1: Title}
  - \text{p: Article Body with span text.}
Semantic Elements in HTML 5

Caveats to note in Internet Explorer (surprised?)

• Get Internet Explorer to easily recognize these (and other) elements in your HTML with the simple fix illustrated below.

```html
<!--[if IE]>
<script>
  var e = "abbr,article,aside,audio,canvas,datalist,details," +
          "figure,footer,header,hgroup,mark,menu,meter,nav,output," +
          "progress,section,time,video".split(',');
  var i = e.length;
  while (i--)
    { document.createElement(e[i]); }  
</script>
<![endif]-->

• Remy Sharp provides this code in a convenient minified format for inclusion in your HTML.

The `<datalist>` and `<datagrid>` Element

- Assists form elements and data displays
- `<datalist>` provides an enumerated list of values. This can be connected to a freeform text input using the “list” attribute.
- `<datagrid>` generates a tree-styled set of data which can be interactive via an API
The `<audio>` and `<video>` Elements

- Native support for inline audio and video now supported in HTML 5.
- Native API to get status of multimedia and hooks for controlling playback.
- Browser compatibility between formats are still an issue.

### Audio Format Support

<table>
<thead>
<tr>
<th></th>
<th>Ogg Vorbis</th>
<th>MP3</th>
<th>WAV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Firefox 3.5+</td>
<td>✓</td>
<td>-</td>
<td>✓</td>
</tr>
<tr>
<td>Safari 4+</td>
<td>-</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Chrome 3+</td>
<td>✓</td>
<td>✓</td>
<td>-</td>
</tr>
<tr>
<td>Opera 10+</td>
<td>-</td>
<td>-</td>
<td>✓</td>
</tr>
<tr>
<td>IE</td>
<td>No support.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Video Format Support

<table>
<thead>
<tr>
<th></th>
<th>Theora Vorbis</th>
<th>H.264</th>
</tr>
</thead>
<tbody>
<tr>
<td>Firefox 3.5+</td>
<td>✓</td>
<td>-</td>
</tr>
<tr>
<td>Safari 3+</td>
<td>-</td>
<td>✓</td>
</tr>
<tr>
<td>Chrome 3+</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Opera 10+</td>
<td>-</td>
<td>✓</td>
</tr>
<tr>
<td>IE</td>
<td>No support.</td>
<td></td>
</tr>
</tbody>
</table>
The `<audio>` Element

Attributes

- `src` contains a valid URL to the audio content
- `controls` tells the browser to display its default controls
- `autobuffer` tells the browser to begin downloading the media immediately when the page is loaded
- `autoplay` tells the browser to start playing the media as soon as it can
- `loop` tells the browser if it should start again once the media playback has ended

Methods

- `play()` starts media playback
- `pause()` pauses media playback
- `canPlayType(mime-type)` asks the browser to verify if it supports the given mime-type

* As of version 10, Opera only supports the `Audio()` object and `play()` method.

```
/audio src="theRaven_Poe.ogg" controls autobuffer>
  <a href="theRaven_Poe.ogg" title="Download the Sample">OGG</a>
  <a href="theRaven_Poe.mp3" title="Download the Sample">MP3</a>
  <a href="theRaven_Poe.wav" title="Download the Sample">WAV</a>
</audio>
```
The `<audio>` Element

- `<source>` allows multiple media files to be used to improve compatibility
  - The only change is that the `src` attribute is now placed within the `<source>` element.
  - A flash-based solution never hurts either.
- **Firefox** needs its file FIRST!
  (Firefox cannot degrade to the next `<source>` element if the first one fails.)
- Could this possibly be easier?

```html
<audio controls autobuffer>
  <source src="theRaven_Poe.ogg" />
  <source src="theRaven_Poe.mp3" />
  <source src="theRaven_Poe.wav" />
  <!-- Flash solution here for complete support. -->
  <!-- If no flash, then at least the links will show. -->
  <a href="theRaven_Poe.ogg" title="Download the Sample">OGG</a>
  <a href="theRaven_Poe.mp3" title="Download the Sample">MP3</a>
  <a href="theRaven_Poe.wav" title="Download the Sample">WAV</a>
</audio>
```
The `<video>` Element

Attributes
- The same attributes as `<audio>`, plus...
  - `height` and `weight` sets the size of the video window

Methods
- The same methods as `<audio>`

- REALLY annoying type attribute[6]. Must describe container AND codec within the attribute value

```
<source src="pr6.mp4" type='video/mp4; codecs="avc1.42E01E, mp4a.40.2"'>
```

- Still, saves on bandwidth when browser ignores unsupported files

Caveats
- Unlike with the `<audio>` element, Firefox doesn’t care which source comes first!
- IE needs some special help. (Surprised?)
  http://diveintohtml5.org/video.html#ie
The `<canvas>` Element

- Arguably the single most complicated element officially supported!
- Not new, but since adoption in HTML5 we can expect much better support and adoption.
- Experimental 3D support in Opera[^7] and Firefox[^8] with varying implementations

**Internet Explorer** needs an external script (`excanvas.js`) to support `<canvas>` elements[^9]

**Internet Explorer** is SLOW with this configuration.

<table>
<thead>
<tr>
<th></th>
<th>Canvas Support</th>
</tr>
</thead>
<tbody>
<tr>
<td>Firefox 3+</td>
<td>✔️</td>
</tr>
<tr>
<td>Safari 3+</td>
<td>✔️</td>
</tr>
<tr>
<td>Chrome 2+</td>
<td>✔️</td>
</tr>
<tr>
<td>Opera 9.2+</td>
<td>✔️</td>
</tr>
<tr>
<td>IE</td>
<td>External Support Needed</td>
</tr>
</tbody>
</table>
The `<canvas>` Element

Testing Compatibility

- Using `getContext('2d')` we can test the browsers ability to support `<canvas>` methods.
- Calling this method prepares the browser to draw on the area.

```javascript
$(function () {
    var obj = $("#ourCanvasEx")[0];
    if (obj.getContext) {
        var context = obj.getContext("2d");
        if (context) {
            context.strokeRect(25, 25, 250, 100);
            context.textAlign = "center";
            context.fillText("It works!", 150, 75);
        }
    }
});
```
The `<canvas>` Element

Drawing Lines and Shapes

Attributes (all within the ‘2d’ context)
- `fillStyle` accepts #hex, rgb(), and rgba() and gradients
- `strokeStyle` accepts the same as above
- `lineWidth` accepts an integer as width in pixels
- There are more, but this is a good start!

Methods (all within the ‘2d’ context)
- `fillRect(x, y, width, height)` will make a filled in rectangle
- `strokeRect(x, y, width, height)` will make an outlined rectangle
- `clearRect(x, y, width, height)` will erase all contents within the dimensions given
- `moveTo(x, y)` moves your virtual pen to the canvas’s coordinates
- `lineTo(x, y)` draws a line from the previous location to the new location
- `fill()` fills in within the virtual lines drawn using the above functions
- `stroke()` draws just the lines using the above functions
- `closePath()` will draw a virtual line back to the first point
Attributes (all within the ‘2d’ context)

- **font** accepts anything that would go in the CSS “font” rule (font, variant, weight, size...)
- **textAlign** accepts **start**, **end**, **left**, **right** and **center** which all do what you’d expect (left = start, right = end)
- **textBaseline** accepts **top**, **hanging**, **middle**, **alphabetic**, **ideographic**, or **bottom**

Methods (all within the ‘2d’ context)

- **fillText(text, x, y)** will draw text at the coordinates (x,y)
The `<canvas>` Element

Drawing Gradients

Methods (all within the ‘2d’ context)

- `createLinearGradient(x0, y0, x1, y1)` paints along a line from (x0, y0) to (x1, y1).
- `createRadialGradient(x0, y0, r0, x1, y1, r1)` paints along a cone between two circles. The first three parameters represent the start circle, with origin (x0, y0) and radius r0. The last three parameters represent the end circle, with origin (x1, y1) and radius r1.
- `addColorStop(0<n<1, color)` adds a transitionary color in the gradient. (This method acts on the object created by the above two methods.)

**Internet Explorer with excanvas.js does not support Radial Gradients!**

```javascript
// Within a context
var grad = context.createLinearGradient(0,0,300,0);
grad.addColorStop(0,”black”);
grad.addColorStop(0.5,”red”);
grad.addColorStop(1,”blue”);
context.fillStyle = grad;
context.fillRect(0,0,100,100);
```
The `<canvas>` Element

Drawing Images

• Drawing images uses a complex method which can be used in three different ways
  – `drawImage(img_elem, dx, dy)`
  – `drawImage(img_elem, dx, dy, dw, dh)`
  – `drawImage(img_elem, sx, sy, sw, sh, dx, dy, dw, dh)`

• `img_elem` is the `<img>` or `<canvas>` element to draw.

** Internet Explorer with excanvas.js does not correctly scale strokes from other canvases!
The `<canvas>` Element
Drawing Images

- Can also manipulate images pixel-by-pixel:
  - `createImageData(w,h)` creates an object to draw a picture
  - `getImageData(sx,sy,w,h)` can get the pixel data from a canvas object
  - `putImageData(img_data,dx,dy)` draws the pixel data onto the canvas in the coordinates specified

- These methods use an `ImageData` object which is defined

```javascript
{  width:w,
   height:h,
   data: array(r,g,b,a,...) //size = (w*h*4)
}
```
The `<canvas>` Element
Great Examples and Demonstrations

- **Basic Image Inversion Filter**

- **Mandelbrot Fractal Generator**
  [http://jwf.us/blog_apps/mandelbrot_canvas/](http://jwf.us/blog_apps/mandelbrot_canvas/)

- **Torus**

- **Twitter Visualization**

- **MORE!**
The manifest Attribute
Offline Caching

- The page along with files within the MANIFEST will be downloaded and will not be re-cached until the MANIFEST is changed!

- The MANIFEST attributes points to a relative file which identifies which files should be included. 

- Directives to be used within the MANIFEST
  - **CACHE**: is used to specify a file’s relative path for local caching. (default)
  - **NETWORK**: specifies that these files should ALWAYS be sources from the network
  - **FALLBACK**: specifies files to substitute should a file within the given namespace is unavailable

- **Example**: http://html5demos.com/offlineapp

**NOTE**: For this demo to work, it must be retrieved from the network. Needs Safari 4+ or Firefox 3.5.3+
Database API

• Very young implementation and currently only works in specialized builds of webkit-based browsers (Safari 4+, iPhone and iTouch OS 2.2)
• Most implementations in a SQLite storage engine.

Methods
• `openDatabase(name, version, display_name, size)` initializes a database in the browser’s local cache.
• `executeSql(sql, data, callback)` executes a SQL statement within the opened database

**NOTE:** Synchronous call

• DB Storage Tutorial
  http://www.weboshelp.net/webos-tutorials/156-palm-webos-html5-database-storage-tutorial
• Third-party Demo:
  http://code.google.com/apis/gears/samples/hello_world_database.html
Thank you!

- Plenty of resources available as the technology matures. (See References in this Presentation)

- This presentation is available for download with examples.  

- Corrections and suggestions via email  
  mg@nobulb.com
References

1. HTML 5 differences from HTML 4
   http://www.w3.org/TR/2008/WD-html5-diff-20080122/

2. HTML5 DOCTYPE
   http://ejohn.org/blog/html5-doctype/

3. An explanation of DOCTYPEs
   http://diveintohtml5.org/semantics.html#the-doctype

4. A Brief Discussion on How Browsers Handle Unknown Elements
   http://diveintohtml5.org/semantics.html#unknown-elements

5. Native Audio in the browser
   http://html5doctor.com/native-audio-in-the-browser/

6. `<video> "type" parameters`
   http://wiki.whatwg.org/wiki/Video_type_parameters

7. Opera 3D support for `<canvas>`
(More) References

8. Firefox 3D support for `<canvas>`

9. Internet Explorer `<canvas>` support (ExCanvas)
   http://code.google.com/p/explorercanvas/

10. WHATWG specification on `<canvas>`
    http://www.whatwg.org/specs/web-apps/current-work/multipage/the-canvas-element.html#the-canvas-state

11. Collection of HTML 5 Demos
    http://html5demos.com/